INTEGRATED ENCLOSURE FOR VIDEO SURVEILLANCE CAMERA

CROSS REFERENCES TO RELATED APPLICATIONS

Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to video surveillance cameras, and more particularly to an improved enclosure and mounting chassis for a video surveillance camera.

Description of the Related Art

Presently, installation, set-up, and servicing of video surveillance camera enclosures are relatively difficult and time consuming. Installation of the surveillance camera requires assembly of the camera chassis into the enclosure at the installation site to accommodate cable connection and data addressing. In addition, servicing of installed cameras often requires partial, if not complete disassembly of the camera chassis, which results in increased repair time and costs.

An improved video surveillance camera enclosure is desired, which reduces the time and costs associated with installation and service.

BRIEF SUMMARY OF THE INVENTION

One aspect of the present invention is a video surveillance camera enclosure that includes a camera housing for receiving a video surveillance camera chassis through a lower end. The housing is adapted to be inserted into an opening in a ceiling member and includes at least one connector on an upper end of the housing for electrical connection to a video surveillance camera monitoring system. The video surveillance camera monitoring system is typically comprised of at least one video monitor and/or a video-recording device. The housing includes a flange near the lower end for engaging the lower surface of the perimeter of the opening in the ceiling member. A plurality of mounting clamps are positioned around

the housing near the flange. The mounting clamps have a first position relatively flush with the exterior of said housing so the housing can be inserted into the opening. The mounting clamps have a second position extended substantially perpendicularly outward from the exterior of the housing for engaging the upper surface of the perimeter of the opening in the ceiling. The mounting clamps are moveable from the first position to the second position to capture the portion of the ceiling member, adjacent the opening, between the flange and the mounting clamps to secure the housing to the ceiling member. A video surveillance camera chassis and a video surveillance camera attached to the chassis can be inserted into the housing through the lower end for installation at a user's site.

The video surveillance camera chassis can include a plurality of positioning members on the perimeter of the chassis. The positioning members are engageable with a plurality of alignment flanges on the interior of the housing to guide the chassis into a preselected position within the housing. Each of the positioning members include a shoulder for releaseably engaging the corresponding alignment flanges. Each of the shoulders are moveable between a first position butted against the flange to capture the chassis in the preselected position and a second position free of the flange for removal of the chassis. Each shoulder is biased into the first position.

A first blind mating connector is located on the interior of said housing in the upper end and is adapted to mate with a second blind mating connector on the video surveillance camera chassis. Blind mating connectors are connectors that are adapted to mate together without the need for visually seeing the connectors. When the chassis is captured in its preselected position, the first and second blind mating connectors are in mateable relation to each other. A suitable fastener is used to compress the chassis toward the upper end of the housing to mate the first and second blind mating connectors together and to secure the chassis to the housing.

A printed circuit board, electrically connected to the second blind mating connector, can include at least one light emitting diode (LED), which can be remotely viewed at the lower end of the housing for set-up and/or trouble shooting of the video surveillance camera dome.

Another aspect of the present invention is a video surveillance camera chassis for mounting a video surveillance camera in a video surveillance camera housing. The chassis includes a support member having a lower end adapted for installation of a video surveillance

camera and a plurality of positioning members on the perimeter of the support member. The positioning members are engageable with a plurality of alignment flanges on the interior of a video surveillance camera housing to guide the support member into a preselected position within the housing. Each of the positioning members includes a shoulder for releaseably engaging a corresponding alignment flange. Each of the shoulders are moveable between a first position butted against the flange to capture the support member in its preselected position and a second position free of the flange for removal of the support member. Each shoulder is biased in the first position.

In one embodiment, a first blind mating connector on the interior of the housing is adapted to mate with a second blind mating connector on the support member. When the support member is captured in its preselected position, the first and second blind mating connectors are in mateable relation to each other. At least one fastener is used to compress the support member toward the upper end of the housing to mate the first and second blind mating connectors together and to secure the support member to the housing. A switch, selectable from the exterior of the housing without the need for disassembly, can be included on a printed circuit board connected to the support member.

In an alternate embodiment, for an enclosure with a housing adapted for mounting outside of a ceiling, or outdoors, an optical quality dome cover is installed on the lower portion of the enclosure. A switch, selectable from the exterior of the housing without the need for disassembly, can be included on a printed circuit board connected to the support member. At least one fan can be attached to the support member for circulating air across the printed circuit board, across a camera pan motor attached to the support member, and across the interior surface of a dome cover attached to the housing. A controllable heater element can be attached to the support member to heat the circulating air for outdoor installations.

A printed circuit board, which can be electrically connected to the blind mating connector, may include at least one light emitting diode (LED), which can be remotely viewed at the lower end of the housing for set-up and/or trouble shooting of the video surveillance camera dome.

Objectives, advantages, and applications of the present invention will be made apparent by the following detailed description of embodiments of the invention.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Figure 1 is an exploded lower perspective view of one embodiment of the present invention.

Figure 2 is an exploded upper perspective view of one embodiment of the present invention.

Figure 3 is an exploded upper perspective view of one embodiment of the video surveillance camera chassis of the present invention.

Figure 4 is partial cross-sectional view taken along line 4-4 in Fig. 3.

Figure 5 is an exploded lower perspective view of an alternate embodiment of the present invention with heater for outdoor applications.

Figure 6 an exploded upper perspective view of the embodiment of Fig. 5.

Figure 7 is an exploded perspective view of the heater assembly used with the embodiment of Fig. 5.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Fig. 1, one embodiment of the present invention is illustrated at 2. Pan and tilt video camera assembly 4 is installed on video surveillance camera chassis 6. Chassis 6 is inserted into video surveillance camera housing 8 as illustrated and as fully described hereinbelow. Camera housing 8 is adapted to be inserted into a suitable opening 7 in a ceiling member 9. As illustrated in this example, housing 8 is shaped substantially like a cylinder and the corresponding opening 7 in the ceiling member 9 must be substantially circular and sized large enough in diameter to receive housing 8 but smaller in diameter than flange 10. Flange 10 will thus rest against the lower surface 11 of the ceiling at the perimeter of the opening when housing 8 is inserted therein. Housing 8 includes a plurality of mounting clamps 12 around the circumference of housing 8, each positioned on a threaded fastener 13. Mounting clamps 12 have a first position substantially flush with the exterior of housing 8 to facilitate insertion of housing 8 into the opening in the ceiling.

Referring to Fig. 2, once housing 8 is inserted into the opening 7 in the ceiling member 9, threaded fasteners 13 are screwed into threaded nut 14 which moves mounting clamps 12 into a second position substantially perpendicular to housing 8 as illustrated. As threaded fasteners 13 are further screwed into nuts 14, mounting clamps 12 move closer to flange 10 and will engage the upper surface 17 of the ceiling at the perimeter of the opening 7. The

perimeter of the ceiling member adjacent the opening will be captured in the space 15 between flange 10 and mounting clamps 12, and can be secured therein with additional movement of mounting clamps 12 by further screw adjustment of fasteners 13. Cover 16 can be used to protect the upper portion of housing 8, including connectors 18, from potential dirt and debris in the ceiling, and as may be required by code in certain installations. As fully described hereinbelow, connectors 18 allow easy connection to the wiring of a video surveillance camera system, which can consist of one or more video monitors and/or one or more video recording devices (not shown). An optical quality dome cover or bubble 20, which can be injection molded, can be installed at the lower end of housing 8.

Referring again to Fig. 1, a plurality of positioning members 22 on chassis 6 assist in the installation of chassis 6 into housing 8. Positioning members 6 have a guide channel 23 that receives and engages corresponding alignment flanges 24 positioned on the interior of housing 8 to guide chassis 6 into housing 8. For reasons that will become apparent, positioning members 22 and alignment flanges 24 are adapted so that chassis 6 can only be inserted into housing 8 in one preselected orientation. In this example, three positioning members 22 unevenly spaced about chassis 6 are used with corresponding alignment flanges 24 to place chassis 6 in the desired preselected position within housing 8. However, it is envisioned that any number of positioning members 22 and alignment flanges 24 can be strategically mounted and used to guide chassis 6 into the desired position within housing 8.

Referring to Fig. 3, chassis 6 includes printed circuit board (PCB) 26 for interfacing pan and tilt camera assembly 4 and other electrical systems such as pan motor 25 and fan 27 to a video camera surveillance system. PCB 26 is connected to chassis 6 in a fixed orientation and includes connector 28, which mates with a second connector located on the inside of housing 8 (not shown). Connector 28 and its mate on the inside of housing 8 are connectors that are adapted to mate without the need for an installer to see the connectors, and are commonly called blind mating connectors.

Chassis 6 will typically be inserted into housing 8, after housing 8 has been installed in a ceiling. Housing 8 will be electrically connected to a video camera surveillance system via connectors 18. Chassis 6 is electrically connected to a second blind mating connector within housing 8, which is electrically connected to connectors 18. Positioning members 22 and alignment flanges 24 orient chassis 6 and PCB 26 so that blind mating connector 28 is properly aligned with the second blind mating connector within housing 8. If chassis 6 is

pushed upward into housing 8 to mate blind mating connector 28 with the second blind mating connector on the interior of housing 8, the force is transferred directed to housing 8 and to the ceiling member to which housing 8 is attached. Too much force could be applied to the ceiling member, especially if the ceiling member is made of a fibrous tile typically used in drop ceilings. To prevent that occurring, each positioning member 22 includes a shoulder member 30, which engages each corresponding flange 24 to capture and suspend chassis 6 in a pre-connected, hands-free position prior to final connection as described below.

Referring to Fig. 4, a cross-sectional view of a positioning member 22 illustrates shoulder member 30 having a shoulder 31 that engages flange 24 (shown in fantom). Shoulder members 30 can be biased against flange 24 and engage flanges 24 with an audible "click" so that an installer knows when chassis 6 is captured in place within housing 8. Once captured and suspended in the pre-connected position, threaded fasteners 32 thread into corresponding threaded apertures 33 in flanges 24, shown in Fig. 1. Upon tightening fasteners 32 into threaded apertures 33, chassis 6 is pulled further into housing 8 and blind mating connector 28 is mated with the second blind mating connector in the interior of housing 8 until fully seated. Therefore, the force of insertion of chassis 6 into housing 8 for final connection of the blind mating connectors, is not transferred to the ceiling, but is retained fully within housing 8 by fasteners 32 pulling into threaded apertures 33 and pulling chassis 6 into housing 8.

Referring to Figs. 5 and 6, housing 40, which is identical to housing 8 except mounting clamps 12 are not needed, is installed in an enclosure 42 instead of being enclosed within a ceiling. Chassis 6 in inserted into housing 40 in the same manner as described above for housing 8. Connectors 18 are shown extending out of housing 40 as part of blind mating cable assembly or pigtail 44 and are not connected to the housing as shown in Fig. 2. Pigtail 44 extends from a blind mating connector within housing 40 (not shown) that connects to blind mating connector 28 on PCB 26. Pigtail 44 can be used in both housing 8 and housing 40 embodiments. In housing 8, pigtail 44 is coiled within housing 8 and all the connectors are mounted on housing 8, and in housing 40, pigtail 44 extends outside of housing 40 and only the blind mating connector is mounted within housing 40. Using pigtail 44 with both housing 8 and housing 40 embodiments reduces the number of inventory items required, and reduces manufacturing costs. Pigtail 44 extends through enclosure 42 and connectors 18 mate

with connectors on the wiring harness of a video surveillance camera system. Optical quality dome bubble 46 can be installed at the lower end of housing 40.

Referring to Fig. 7, if enclosure 42 is used in an outdoor installation, fan and heater assembly 48 can be connected to chassis 6, as shown in Fig. 5. A plurality of apertures 52 on chassis 6 and fan 27 in conjunction with vents 54 (shown in Fig. 3) assist fans 50 with air circulation through chassis 6. Fans 50 circulate air across the interior surface of dome bubble 46, through apertures 52, across printed circuit board 26, across pan motor 25, and across thermostatically controllable heater 55. The air flow within housing 40 and across dome bubble 46 distributes heat evenly throughout housing 40, cooling the pan motor 25 and PCB 26 in warm weather, and defogging and deicing dome bubble 46 in humid and cold weather. The air flows unidirectionally in a similar manner to that disclosed in U.S. Patent Number 6,061,087, the disclosure of which is incorporated herein by reference. With the improvement herein being that the air flows across the interior of the dome bubble, and across printed circuit board 26 and pan motor 25. Fan 27 assists fans 50 in the air flow across printed circuit board 26 and pan motor 25. Caps 53 as shown in Fig. 1 can be used to cap apertures 52 for indoor installations.

Referring back to Fig. 3, switches 56 are used to select the appropriate address for the video camera assembly 4 for proper interface with the video surveillance camera system. The video surveillance camera system may have many cameras and each must have a unique address for proper control and monitoring. During installation of the dome camera, switches 56 must be selected to correspond to the correct address for the particular dome camera placement within the video surveillance system. For enclosure 42, switches 56 are positioned on PCB 26 so that selection of the proper address can be selected through aperture 58. Therefore, enclosure 42, housing 40, chassis 6, and dome bubble 46 can be fully assembled at the factory, shipped, and installed without the need to disassemble to reach the switches 56 at the installation site. For ceiling mounted installations, the switches are also easily switched and the proper address selected through a suitable opening 57 in the top portion of housing 8, as shown in Fig. 2.

PCB 26 can include one or more LEDs (not shown), or other light emitting device, used for camera set-up and servicing. The LEDs can be different colors and/or positions. The LEDs must be viewed while the camera assembly 4 is energized and are positioned on the lower side of PCB 26. To enable an installer to view the LEDs from below the chassis 6 and

camera assembly 4 when it is installed in housing 8 or housing 40, an LED view port 60 extends from adjacent each LED on PCB 26 to an unobstructed position on the lower side of chassis 6. The glow from the LED can thus be seen from below the installed camera assembly. The LED view port 60 can be funnel shaped as illustrated in Fig. 3 to more easily view the LED from below.

It is to be understood that variations and modifications of the present invention can be made without departing from the scope of the invention. It is also to be understood that the scope of the invention is not to be interpreted as limited to the specific embodiments disclosed herein, but only in accordance with the appended claims when read in light of the forgoing disclosure.